



SEQUENCE LISTING

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Herrington, Todd
Fernandez-Salas, Ester

<120> Clostridia Neurotoxin Compositions and Modified Clostridia
Neurotoxins

<130> ALLE0014-103 (17355CIP3)

<140> US 10/757,077
<141> 2004-01-14

<150> US 10/163,106
<151> 2003-06-04

<150> US 09/620,840
<151> 2000-07-21

<150> US 09/910,346
<151> 2001-07-20

<160> 136

<170> PatentIn version 3.2

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Ser Asp Arg Gln Asn Leu Ile
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Ser Asp Lys Gln Thr Leu Leu
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Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
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Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr
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Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr
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Ser Lys
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Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu
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Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser
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Val Lys
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Met Pro Ile Thr Ile Asn Asn Phe Asn Tyr Ser Asp Pro Val Asp Asn
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 Lys Asn Ile Leu Tyr Leu Asp Thr His Leu Asn Thr Leu Ala
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 Glu Asn Ser Gly Gln Asn Ile Glu Arg Asn Pro Ala Leu Gln Lys Leu
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Thr Lys
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Lys Lys Ile Ile Arg Phe Cys Lys Asn Ile Val Ser Val Lys Gly Ile
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Arg Lys
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Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Ser Ile Pro Asp
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Arg Lys
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Asn Gly Gln Asn Lys Ala Val Asn Lys Glu Ala Tyr Glu Glu Ile Ser
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Leu Glu His Leu Val Ile Tyr Arg Ile Ala Met Cys Lys Pro Val Met
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Tyr Lys
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Met Pro Phe Ala Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
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Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
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Asn Thr Glu Ile Asn Asn Met Asn Arg Thr Lys Leu Lys Asn Phe Thr
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Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr
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Ser Lys
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met
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Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
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Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Ala Ala
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Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr
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Ser Lys
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Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn His Asn Gly Gln
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Ser Lys
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Met Pro Phe Val Asn Lys His Phe Asn Tyr Lys Asp Pro Val Asn Gly
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Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met
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Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr
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Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Ala Arg Gly Ile Ile Thr
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Ser Lys
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1 5 10 15

Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu
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Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Arg Met Cys Lys Ser
35 40 45

Val Lys
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Asp Asn Ile Ile Ala Ala Glu Pro Pro Phe Ala Arg Gly Thr
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Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Asn Lys Met Gly Lys
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Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu
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Ile Ser Lys Glu His Leu Ala Val Arg Lys Ile Gln Met Cys Lys Ser
35 40 45

Val Lys
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Asp Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr
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Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Lys Glu Glu
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Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser
35 40 45

Val Lys
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Ser Arg Asn Pro Ala Leu Arg Lys Val Asn Pro Glu Asn Met Leu Tyr
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Asn Lys
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Glu Asn Ser Gly Gln Asn Ile Glu Arg Asn Pro Ala Leu Gln Lys Leu
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Ser Ser Glu Ser Val Val Asp Leu Phe Thr Lys Ala Cys Leu Arg Leu
35 40 45

Thr Lys
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Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr
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Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
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Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly His Val
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Lys Lys Ile Ile Arg Phe Cys Lys Asn Ile Val Ser Val Lys Gly Ile
35 40 45

Arg Lys
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Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr
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Lys Lys Ile Ile Arg Phe Cys Lys Asn Ala Ala Ser Val Lys Gly Ile
35 40 45

Arg Lys
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Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Arg
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Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val
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Lys Lys Ile Ile Arg Phe Cys Lys Asn Ile Val Ser Ala Lys Gly Ile
35 40 45

Arg Lys
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Met Pro Ala Ala Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp
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Asp Thr Ile Leu Tyr Met Gln Ile Pro Tyr Glu Glu Lys Ser
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Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu Ala Val Asn Asn Arg
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Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Ser Ile Pro Asp
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Lys Gly Leu Val Glu Lys Ile Val Lys Phe Cys Lys Ser Ala Ile Pro
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Arg Lys
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Asp Asp Ile Ile Met Met Glu Pro Phe Asn Asp Pro Gly Pro
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Gln Asn Glu Gly Phe Asn Ile Ala Ser Lys Asn Leu Lys Thr Glu Phe
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Asn Gly Gln Asn Lys Ala Val Asn Lys Glu Ala Tyr Glu Glu Ile Ser
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Leu Glu His Leu Val Ile Tyr Arg Ile Ala Met Cys Lys Pro Ala Met
35 40 45

Tyr Lys
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Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
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Val Asp Ile Ala Tyr Ile Lys Ile Pro His
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Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
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Asn Thr Glu Ile Asn Asn Met Asn Ala Ala Ala Ala Ala Ala Ala Ala
20 25 30

Ala Ala Cys Val Arg Gly Ile Ile Thr Ser Lys
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Met Ala Ala Ala Asn Tyr Lys Pro Asp Val Asn Gly Val Asp Ile Ala
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Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met
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Gly Lys Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
1 5 10 15

Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr
20 25 30

Gly Leu Phe Glu Phe Tyr Lys Cys Val Arg Gly Ile Ile Thr Ser Lys
35 40 45

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Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
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Val Asp Ile Ala Arg Asn Ala Gly Gln Met
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Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala His Asn Thr Glu Ile
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Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu
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Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser Lys
 35 40 45

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Met Pro Phe Val Asn Lys Gln Phe Asn Val Asn Gly Val Asp Ile Ala
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Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met
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Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln
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Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr
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Gly Leu Phe Glu Phe Arg Arg Thr Ser Lys
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Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn
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Asp Asn Ile Ile Ala Ala Ala Ala Ala Ala Ala Arg Gly Thr
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Tyr Thr Ile Pro Pro Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys
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Ile Ser Lys Glu His
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Met Pro Ala Phe Asn Tyr Asn Asp Pro Ile Asp Asn Asp Asn Ile Ile
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Met Met Glu Pro Pro Phe Ala Arg Gly Thr
20 25

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Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys
1 5 10 15

Glu Tyr Arg Gly Gln Asn Lys Ala Ala Ala Ala Ala Ala Glu Glu
20 25 30

Ile Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser Val
35 40 45

Lys

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Ala Arg Gly Thr
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Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys
1 5 10 15

Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Ala Ala
20 25 30

Ala Ala Ala Ala Ile Gln Met Cys Lys Ser Val Lys
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Met Ser Asp Pro Val Asp Asn Lys Asn Ile Leu Tyr Leu Asp Thr His
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Leu Asn Thr Leu Ala
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Asn Ile Pro Lys Ser Asn Leu Asn Val Leu Phe Met Gly Gln Asn Leu
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Ser Arg Asn Pro Ala Leu Arg Lys Val Asn Pro Glu Asn Met Leu Ala
20 25 30

Ala Ala Cys His Lys Ala Ile Asp Gly Arg Ser Leu Tyr Asn Lys
35 40 45

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Met Thr Arg Pro Val Lys Asp Asp Pro Val Asn Asp Asn Asp Ile Leu
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Tyr Leu Arg Ile Pro Gln Asn Lys Leu Ile

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Tyr Thr Ile Arg Asp Gly Phe Asn Leu Thr Asn Lys Gly Phe Asn Ile
 1 5 10 15

Glu Asn Ser Gly Gln Asn Ile Glu Arg Asn Pro Ala Leu Gln Lys Leu
 20 25 30

Asp Leu Pro Pro Lys Val Cys Leu Arg Leu Thr Lys
 35 40

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Met Pro Lys Ile Asn Ser Pro Pro Asn Tyr Asn Asp Pro Val Asn Asp
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Arg Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr
 20 25 30

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Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
 1 5 10 15

Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val
 20 25 30

Lys Lys Ala Ala Ala Ala Cys Lys Asn Ile Val Ser Val Lys Gly Ile
 35 40 45

Arg Lys
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Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Ala Ala Ala Ala
1 5 10 15

Asn Asp Arg Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe
20 25 30

Tyr

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Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
1 5 10 15

Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val
20 25 30

His Arg Phe Cys Lys Asn Ile Val Ser Val Lys Gly Ile Arg Lys
35 40 45

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<400> 78

Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp Arg
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Thr Ile Leu Lys Ile Lys Pro Gly Gly Cys Lys Glu Phe Tyr
20 25 30

<210> 79

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Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
1 5 10 15

Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Pro
20 25 30

Pro

<210> 80
<211> 24
<212> PRT
<213> Clostridium botulinum

<400> 80

Met Pro Asn Tyr Asn Asp Pro Val Asn Asp Asp Thr Ile Leu Tyr Met
1 5 10 15

Gln Ile Pro Tyr Glu Glu Lys Ser
20

<210> 81
<211> 48
<212> PRT
<213> Clostridium botulinum

<400> 81

Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu Ala Val Asn Asn Arg
1 5 10 15

Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Ser Ile Pro Asp
20 25 30

Lys Gly Ala Ala Ala Ala Ala Ala Cys Lys Ser Val Ile Pro Arg Lys
35 40 45

<210> 82
<211> 26
<212> PRT
<213> Clostridium botulinum

<400> 82

Met Pro Val Asn Ile Pro Pro Asp Pro Ile Asn Asn Asp Asp Ile Ile
1 5 10 15

Met Met Glu Pro Phe Asn Asp Pro Gly Pro
20 25

<210> 83
<211> 32
<212> PRT
<213> Clostridium botulinum

<400> 83

Gln Asn Glu Gly Phe Asn Ile Ala Ser Lys Asn Leu Thr Glu Phe Asn
1 5 10 15

Gly Gln Asn Lys Ala Val Asn Lys Glu Ala Tyr Ala Ala Ala Ala Ala
20 25 30

<210> 84
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<212> PRT
<213> Clostridium botulinum

<400> 84

Met Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile
1 5 10 15

Pro Asn Ala Gly Gln Met
20

<210> 85
<211> 38
<212> PRT
<213> Clostridium botulinum

<400> 85

Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Phe Asn Gly Gln Asn
1 5 10 15

Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly
20 25 30

Leu Phe Glu Phe Tyr Lys
35

<210> 86
<211> 24
<212> PRT
<213> Clostridium botulinum

<400> 86

Met Pro Phe Val Asn Lys Gln Val Asn Gly Val Asp Ile Ala Tyr Ile
1 5 10 15

Lys Ile Pro Asn Ala Gly Gln Met
20

<210> 87
<211> 39
<212> PRT
<213> Clostridium botulinum

<400> 87

Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Phe Asn Gly Gln Asn
1 5 10 15

Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Leu Leu Cys Val
20 25 30

Arg Gly Ile Ile Thr Ser Lys
35

<210> 88
<211> 24
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<400> 88

Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Ala Tyr Ile
1 5 10 15

Lys Ile Pro Asn Ala Gly Gln Met
20

<210> 89
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<400> 89

Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Phe Asn Gly Gln Asn
1 5 10 15

Thr Glu Ile Asn Asn Met Asn Gly Leu Phe Glu Phe Tyr Lys Leu Leu
20 25 30

Cys Val Arg Gly Ile Ile Thr Ser Lys
35 40

<210> 90
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<400> 90

Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
1 5 10 15

Val Asp Ile Ala
20

<210> 91
<211> 32
<212> PRT
<213> Clostridium botulinum

<400> 91

Gly Phe Asn Leu Arg Asn Asn Thr Glu Ile Asn Asn Met Asn Gly Leu
1 5 10 15

Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser Lys
20 25 30

<210> 92
<211> 23
<212> PRT
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<400> 92

Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn
1 5 10 15

Asp Asn Ile Ile Met Met Glu
20

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<211> 45
<212> PRT
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<400> 93

Tyr Thr Ile Ile Ser Asp Lys Asn Met Gly Lys Glu Tyr Arg Gly Gln
1 5 10 15

Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His
20 25 30

Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser Val Lys
35 40 45

<210> 94
<211> 20
<212> PRT
<213> Clostridium botulinum

<400> 94

Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Glu Pro Pro Phe
1 5 10 15

Ala Arg Gly Thr
20

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<211> 42
<212> PRT
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<400> 95

Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Gly Gln Asn Lys Ala
1 5 10 15

Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val
20 25 30

Tyr Lys Ile Gln Met Cys Lys Ser Val Lys
35 40

<210> 96
<211> 21
<212> PRT
<213> Clostridium botulinum

<400> 96

Met Pro Asn Asp Pro Ile Asp Asn Asp Asn Ile Ile Met Met Glu Pro
1 5 10 15

Phe Ala Arg Gly Thr
20

<210> 97
<211> 30
<212> PRT
<213> Clostridium botulinum

<400> 97

Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Gly Gln Asn Lys Ala
1 5 10 15

Ile Asn Lys Gln Ala Lys Ile Gln Met Cys Lys Ser Val Lys
20 25 30

<210> 98
<211> 23
<212> PRT
<213> Clostridium botulinum

<400> 98

Met Pro Ile Ser Asp Pro Val Asp Asn Lys Asn Ile Leu Tyr Leu Asp
1 5 10 15

Thr His Leu Asn Thr Leu Ala
20

<210> 99
<211> 40
<212> PRT
<213> Clostridium botulinum

<400> 99

Asn Ile Pro Lys Ser Asn Leu Asn Val Leu Phe Met Gly Gln Asn Leu
1 5 10 15

Ser Arg Asn Pro Ala Leu Arg Lys Val Lys Phe Cys His Lys Ala Ile
20 25 30

Asp Gly Arg Ser Leu Tyr Asn Lys
35 40

<210> 100
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<400> 100

Met Thr Trp Val Asn Asp Asn Asp Ile Leu Tyr Leu Arg Ile Pro Gln
1 5 10 15

Asn Lys Leu Ile
20

<210> 101
<211> 33
<212> PRT
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<400> 101

Tyr Thr Ile Arg Asp Gly Phe Asn Leu Thr Asn Lys Gly Phe Asn Ile
1 5 10 15

Glu Arg Asn Pro Ala Asp Leu Phe Thr Lys Val Cys Leu Arg Leu Thr
20 25 30

Lys

<210> 102
<211> 22
<212> PRT
<213> Clostridium botulinum

<400> 102

Met Pro Asp Pro Val Asn Asp Arg Thr Ile Leu Tyr Ile Lys Pro Gly
1 5 10 15

Gly Cys Gln Glu Phe Tyr
20

<210> 103
<211> 40
<212> PRT
<213> Clostridium botulinum

<400> 103

Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
1 5 10 15

Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Arg Phe Cys Lys Asn Ile
20 25 30

Val Ser Val Lys Gly Ile Arg Lys
35 40

<210> 104
<211> 20
<212> PRT
<213> Clostridium botulinum

<400> 104

Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Ile Lys Pro Gly Gly Cys
1 5 10 15

Gln Glu Phe Tyr
20

<210> 105
<211> 44
<212> PRT
<213> Clostridium botulinum

<400> 105

Gly Tyr Asn Ile Asn Asn Gly Gln Asn Ala Asn Leu Asn Pro Arg Ile
1 5 10 15

Ile Thr Pro Ile Thr Gly Arg Gly Arg Val Lys Lys Ile Ile Arg Phe
20 25 30

Cys Lys Asn Ile Val Ser Val Lys Gly Ile Arg Lys
35 40

<210> 106
<211> 22
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<213> Clostridium botulinum

<400> 106

Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp Arg
1 5 10 15

Thr Ile Leu Tyr Ile Lys
20

<210> 107
<211> 42
<212> PRT

<213> Clostridium botulinum

<400> 107

Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala
1 5 10 15

Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Arg Val
20 25 30

Lys Lys Ile Ile Arg Lys Gly Ile Arg Lys
35 40

<210> 108

<211> 25

<212> PRT

<213> Clostridium botulinum

<400> 108

Met Pro Val Ala Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp
1 5 10 15

Asp Thr Ile Leu Tyr Met Gln Ile Pro
20 25

<210> 109

<211> 41

<212> PRT

<213> Clostridium botulinum

<400> 109

Thr Val Ser Glu Gly Asn Ile Gly Asn Leu Ala Val Asn Asn Arg Gly
1 5 10 15

Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Ser Ile Pro Asp Lys
20 25 30

Phe Cys Lys Ser Val Ile Pro Arg Lys
35 40

<210> 110

<211> 38

<212> PRT

<213> Clostridium botulinum

<400> 110

Gln Asn Glu Gly Phe Asn Ile Ala Ser Lys Asn Leu Lys Thr Glu Phe
1 5 10 15

Asn Gly Gln Asn Lys Ala Val Asn Lys Glu Ala Arg Ile Ala Met Cys
20 25 30

Lys Pro Val Met Tyr Lys
35

<210> 111
<211> 423
<212> PRT
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<400> 111

Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp Arg
1 5 10 15

Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr Lys Ser
20 25 30

Phe Asn Ile Met Lys Asn Ile Trp Ile Ile Pro Glu Arg Asn Val Ile
35 40 45

Gly Thr Thr Pro Gln Asp Phe His Pro Pro Thr Ser Leu Lys Asn Gly
50 55 60

Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu Gln Ser Asp Glu Glu Lys
65 70 75 80

Asp Arg Phe Leu Lys Ile Val Thr Lys Ile Phe Asn Arg Ile Asn Asn
85 90 95

Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu Leu Ser Lys Ala Asn Pro
100 105 110

Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn Gln Phe His Ile Gly Asp
115 120 125

Ala Ser Ala Val Glu Ile Lys Phe Ser Asn Gly Ser Gln Asp Ile Leu
130 135 140

Leu Pro Asn Val Ile Ile Met Gly Ala Glu Pro Asp Leu Phe Glu Thr
145 150 155 160

Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn Tyr Met Pro Ser Asn His
165 170 175

Gly Phe Gly Ser Ile Ala Ile Val Thr Phe Ser Pro Glu Tyr Ser Phe
180 185 190

Arg Phe Asn Asp Asn Ser Met Asn Glu Phe Ile Gln Asp Pro Ala Leu
195 200 205

Thr Leu Met His Glu Leu Ile His Ser Leu His Gly Leu Tyr Gly Ala
210 215 220

Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr Gln Lys Gln Asn Pro Leu
225 230 235 240

Ile Thr Asn Ile Arg Gly Thr Asn Ile Glu Glu Phe Leu Thr Phe Gly
245 250 255

Gly Thr Asp Leu Asn Ile Ile Thr Ser Ala Gln Ser Asn Asp Ile Tyr
260 265 270

Thr Asn Leu Leu Ala Asp Tyr Lys Lys Ile Ala Ser Lys Leu Ser Lys
275 280 285

Val Gln Val Ser Asn Pro Leu Leu Asn Pro Tyr Lys Asp Val Phe Glu
290 295 300

Ala Lys Tyr Gly Leu Asp Lys Asp Ala Ser Gly Ile Tyr Ser Val Asn
305 310 315 320

Ile Asn Lys Phe Asn Asp Ile Phe Lys Lys Leu Tyr Ser Phe Thr Glu
325 330 335

Phe Asp Leu Ala Thr Lys Phe Gln Val Lys Cys Arg Gln Thr Tyr Ile
340 345 350

Gly Gln Tyr Lys Tyr Phe Lys Leu Ser Asn Leu Leu Asn Asp Ser Ile
355 360 365

Tyr Asn Ile Ser Glu Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe
370 375 380

Arg Gly Gln Asn Ala Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr
385 390 395 400

Gly Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val
405 410 415

Arg Gly Ile Ile Thr Ser Lys
420

<210> 112
<211> 441
<212> PRT
<213> Clostridium botulinum

<400> 112

Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
Page 32

Page 33

260

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270

Gly Gly Gln Asp Pro Ser Ile Ile Ser Pro Ser Thr Asp Lys Ser Ile
 275 280 285

Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn
 290 295 300

Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr
 305 310 315 320

Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly
 325 330 335

Lys Tyr Ser Ile Asp Val Glu Ser Phe Asn Lys Leu Tyr Lys Ser Leu
 340 345 350

Met Leu Gly Phe Thr Glu Ile Asn Ile Ala Glu Asn Tyr Lys Ile Lys
 355 360 365

Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys
 370 375 380

Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile
 385 390 395 400

Ser Asp Lys Asn Met Gly Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile
 405 410 415

Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr
 420 425 430

Lys Ile Gln Met Cys Lys Ser Val Lys
 435 440

<210> 113

<211> 423

<212> PRT

<213> Clostridium botulinum

<400> 113

Met Pro Phe Val Asn Lys Gln Phe Asn Asn Asp Pro Val Asn Asp Arg
 1 5 10 15

Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr Lys Ser
 20 25 30

Phe Asn Ile Met Lys Asn Ile Trp Ile Ile Pro Glu Arg Asn Val Ile
 35 40 45

Gly Thr Thr Pro Gln Asp Phe His Pro Pro Thr Ser Leu Lys Asn Gly
 50 55 60
 Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu Gln Ser Asp Glu Glu Lys
 65 70 75 80
 Asp Arg Phe Leu Lys Ile Val Thr Lys Ile Phe Asn Arg Ile Asn Asn
 85 90 95
 Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu Leu Ser Lys Ala Asn Pro
 100 105 110
 Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn Gln Phe His Ile Gly Asp
 115 120 125
 Ala Ser Ala Val Glu Ile Lys Phe Ser Asn Gly Ser Gln Asp Ile Leu
 130 135 140
 Leu Pro Asn Val Ile Ile Met Gly Ala Glu Pro Asp Leu Phe Glu Thr
 145 150 155 160
 Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn Tyr Met Pro Ser Asn His
 165 170 175
 Gly Phe Gly Ser Ile Ala Ile Val Thr Phe Ser Pro Glu Tyr Ser Phe
 180 185 190
 Arg Phe Asn Asp Asn Ser Met Asn Glu Phe Ile Gln Asp Pro Ala Leu
 195 200 205
 Thr Leu Met His Glu Leu Ile His Ser Leu His Gly Leu Tyr Gly Ala
 210 215 220
 Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr Gln Lys Gln Asn Pro Leu
 225 230 235 240
 Ile Thr Asn Ile Arg Gly Thr Asn Ile Glu Glu Phe Leu Thr Phe Gly
 245 250 255
 Gly Thr Asp Leu Asn Ile Ile Thr Ser Ala Gln Ser Asn Asp Ile Tyr
 260 265 270
 Thr Asn Leu Leu Ala Asp Tyr Lys Lys Ile Ala Ser Lys Leu Ser Lys
 275 280 285
 Val Gln Val Ser Asn Pro Leu Leu Asn Pro Tyr Lys Asp Val Phe Glu
 290 295 300

Ala Lys Tyr Gly Leu Asp Lys Asp Ala Ser Gly Ile Tyr Ser Val Asn
305 310 315 320

Ile Asn Lys Phe Asn Asp Ile Phe Lys Lys Leu Tyr Ser Phe Thr Glu
325 330 335

Phe Asp Leu Ala Thr Lys Phe Gln Val Lys Cys Arg Gln Thr Tyr Ile
340 345 350

Gly Gln Tyr Lys Tyr Phe Lys Leu Ser Asn Leu Leu Asn Asp Ser Ile
355 360 365

Tyr Asn Ile Ser Glu Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe
370 375 380

Arg Gly Gln Asn Ala Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr
385 390 395 400

Gly Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val
405 410 415

Arg Gly Ile Ile Thr Ser Lys
420

<210> 114

<211> 441

<212> PRT

<213> Clostridium botulinum

<400> 114

Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Asn Asp Pro Ile Asp Asn
1 5 10 15

Asp Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg
20 25 30

Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu
35 40 45

Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly
50 55 60

Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn
65 70 75 80

Thr Asn Asp Lys Lys Asn Ile Phe Phe Gln Thr Leu Ile Lys Leu Phe
85 90 95

Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile
 100 105 110
 Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu
 115 120 125
 Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn
 130 135 140
 Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile
 145 150 155 160
 Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly
 165 170 175
 Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln
 180 185 190
 Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu
 195 200 205
 Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro
 210 215 220
 Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr
 225 230 235 240
 Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe
 245 250 255
 Phe Met Gln Ser Thr Asp Thr Ile Gln Ala Glu Glu Leu Tyr Thr Phe
 260 265 270
 Gly Gly Gln Asp Pro Ser Ile Ile Ser Pro Ser Thr Asp Lys Ser Ile
 275 280 285
 Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn
 290 295 300
 Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr
 305 310 315 320
 Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly
 325 330 335
 Lys Tyr Ser Ile Asp Val Glu Ser Phe Asn Lys Leu Tyr Lys Ser Leu
 340 345 350

Met Leu Gly Phe Thr Glu Ile Asn Ile Ala Glu Asn Tyr Lys Ile Lys
355 360 365

Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys
370 375 380

Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile
385 390 395 400

Ser Asp Lys Asn Met Gly Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile
405 410 415

Asn Lys Gln Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu
420 425 430

Cys Val Arg Gly Ile Ile Thr Ser Lys
435 440

<210> 115
<211> 436
<212> PRT
<213> Clostridium botulinum

<400> 115

Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Asn Asp Pro Val Asn Asp
1 5 10 15

Asp Thr Ile Leu Tyr Met Gln Ile Pro Tyr Glu Glu Lys Ser Lys Lys
20 25 30

Tyr Tyr Lys Ala Phe Glu Ile Met Arg Asn Val Trp Ile Ile Pro Glu
35 40 45

Arg Asn Thr Ile Gly Thr Asn Pro Ser Asp Phe Asp Pro Pro Ala Ser
50 55 60

Leu Lys Asn Gly Ser Ser Ala Tyr Tyr Asp Pro Asn Tyr Leu Thr Thr
65 70 75 80

Asp Ala Glu Lys Asp Arg Tyr Leu Lys Thr Thr Ile Lys Leu Phe Lys
85 90 95

Arg Ile Asn Ser Asn Pro Ala Gly Lys Val Leu Leu Gln Glu Ile Ser
100 105 110

Tyr Ala Lys Pro Tyr Leu Gly Asn Asp His Thr Pro Ile Asp Glu Phe
115 120 125

Ser Pro Val Thr Arg Thr Thr Ser Val Asn Ile Lys Leu Ser Thr Asn
 130 135 140
 Val Glu Ser Ser Met Leu Leu Asn Leu Leu Val Leu Gly Ala Gly Pro
 145 150 155 160
 Asp Ile Phe Glu Ser Cys Cys Tyr Pro Val Arg Lys Leu Ile Asp Pro
 165 170 175
 Asp Val Val Tyr Asp Pro Ser Asn Tyr Gly Phe Gly Ser Ile Asn Ile
 180 185 190
 Val Thr Phe Ser Pro Glu Tyr Glu Tyr Thr Phe Asn Asp Ile Ser Gly
 195 200 205
 Gly His Asn Ser Ser Thr Glu Ser Phe Ile Ala Asp Pro Ala Ile Ser
 210 215 220
 Leu Ala His Glu Leu Ile His Ala Leu His Gly Leu Tyr Gly Ala Arg
 225 230 235 240
 Gly Val Thr Tyr Glu Glu Thr Ile Glu Val Lys Gln Ala Pro Leu Met
 245 250 255
 Ile Ala Glu Lys Pro Ile Arg Leu Glu Glu Phe Leu Thr Phe Gly Gly
 260 265 270
 Gln Asp Leu Asn Ile Ile Thr Ser Ala Met Lys Glu Lys Ile Tyr Asn
 275 280 285
 Asn Leu Leu Ala Asn Tyr Glu Lys Ile Ala Thr Arg Leu Ser Glu Val
 290 295 300
 Asn Ser Ala Pro Pro Glu Tyr Asp Ile Asn Glu Tyr Lys Asp Tyr Phe
 305 310 315 320
 Gln Trp Lys Tyr Gly Leu Asp Lys Asn Ala Asp Gly Ser Tyr Thr Val
 325 330 335
 Asn Glu Asn Lys Phe Asn Glu Ile Tyr Lys Lys Leu Tyr Ser Phe Thr
 340 345 350
 Glu Ser Asp Leu Ala Asn Lys Phe Lys Val Lys Cys Arg Asn Thr Tyr
 355 360 365
 Phe Ile Lys Tyr Glu Phe Leu Lys Val Pro Asn Leu Leu Asp Asp Asp
 370 375 380

Ile Tyr Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu Ala Val Asn
385 390 395 400

Asn Arg Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Lys Asn
405 410 415

Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile
420 425 430

Ile Thr Ser Lys
435

<210> 116
<211> 483
<212> PRT
<213> Clostridium botulinum

<400> 116

Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly
1 5 10 15

Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro
20 25 30

Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg
35 40 45

Asp Thr Phe Tyr Asn Asp Pro Ile Asp Asn Asp Asn Ile Ile Met Met
50 55 60

Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys
65 70 75 80

Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr
85 90 95

Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val
100 105 110

Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn
115 120 125

Ile Phe Phe Gln Thr Leu Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys
130 135 140

Pro Leu Gly Glu Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr
145 150 155 160

Leu Gly Asp Arg Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala
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175

Ser Val Thr Val Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg
180 185 190

Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val
195 200 205

Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala
210 215 220

Ser Arg Glu Gly Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu
225 230 235 240

Tyr Val Ser Val Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile
245 250 255

Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His
260 265 270

Glu Leu Ile His Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp Asp
275 280 285

Leu Pro Ile Val Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr Asp
290 295 300

Thr Ile Gln Ala Glu Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser
305 310 315 320

Ile Ile Ser Pro Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln
325 330 335

Asn Phe Arg Gly Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys Ile
340 345 350

Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp
355 360 365

Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val
370 375 380

Glu Ser Phe Asn Lys Leu Tyr Lys Ser Leu Met Leu Gly Phe Thr Glu
385 390 395 400

Ile Asn Ile Ala Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe
405 410 415

Ser Asp Ser Leu Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn Glu
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425

430

Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly
 435 440 445

Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu
 450 455 460

Glu Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys
 465 470 475 480

Ser Val Lys

<210> 117

<211> 458

<212> PRT

<213> Clostridium botulinum

<400> 117

Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp Arg
 1 5 10 15

Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr Lys Ser
 20 25 30

Phe Asn Ile Met Lys Asn Ile Trp Ile Ile Pro Glu Arg Asn Val Ile
 35 40 45

Gly Thr Thr Pro Gln Asp Phe His Pro Pro Thr Ser Leu Lys Asn Gly
 50 55 60

Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu Gln Ser Asp Glu Glu Lys
 65 70 75 80

Asp Arg Phe Leu Lys Ile Val Thr Lys Ile Phe Asn Arg Ile Asn Asn
 85 90 95

Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu Leu Ser Lys Ala Asn Pro
 100 105 110

Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn Gln Phe His Ile Gly Asp
 115 120 125

Ala Ser Ala Val Glu Ile Lys Phe Ser Asn Gly Ser Gln Asp Ile Leu
 130 135 140

Leu Pro Asn Val Ile Ile Met Gly Ala Glu Pro Asp Leu Phe Glu Thr
 145 150 155 160

Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn Tyr Met Pro Ser Asn His
 165 170 175
 Gly Phe Gly Ser Ile Ala Ile Val Thr Phe Ser Pro Glu Tyr Ser Phe
 180 185 190
 Arg Phe Asn Asp Asn Ser Met Asn Glu Phe Ile Gln Asp Pro Ala Leu
 195 200 205
 Thr Leu Met His Glu Leu Ile His Ser Leu His Gly Leu Tyr Gly Ala
 210 215 220
 Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr Gln Lys Gln Asn Pro Leu
 225 230 235 240
 Ile Thr Asn Ile Arg Gly Thr Asn Ile Glu Glu Phe Leu Thr Phe Gly
 245 250 255
 Gly Thr Asp Leu Asn Ile Ile Thr Ser Ala Gln Ser Asn Asp Ile Tyr
 260 265 270
 Thr Asn Leu Leu Ala Asp Tyr Lys Lys Ile Ala Ser Lys Leu Ser Lys
 275 280 285
 Val Gln Val Ser Asn Pro Leu Leu Asn Pro Tyr Lys Asp Val Phe Glu
 290 295 300
 Ala Lys Tyr Gly Leu Asp Lys Asp Ala Ser Gly Ile Tyr Ser Val Asn
 305 310 315 320
 Ile Asn Lys Phe Asn Asp Ile Phe Lys Lys Leu Tyr Ser Phe Thr Glu
 325 330 335
 Phe Asp Leu Ala Thr Lys Phe Gln Val Lys Cys Arg Gln Thr Tyr Ile
 340 345 350
 Gly Gln Tyr Lys Tyr Phe Lys Leu Ser Asn Leu Leu Asn Asp Ser Ile
 355 360 365
 Tyr Asn Ile Ser Glu Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe
 370 375 380
 Arg Gly Gln Asn Ala Asn Leu Asn Pro Arg Ile Ile Thr Pro Gly Phe
 385 390 395 400
 Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln Asn Thr
 405 410 415

Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly Leu
420 425 430

Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser Lys
435 440 445

Asn Ile Val Ser Val Lys Gly Ile Arg Lys
450 455

<210> 118
<211> 443
<212> PRT
<213> Clostridium botulinum
<400> 118

Met Pro Lys Ile Asn Ser Phe Asn Tyr Met Pro Phe Val Asn Lys Gln
1 5 10 15

Phe Asn Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr Ile Lys
20 25 30

Ile Pro Asn Ala Gly Gln Met Tyr Ile Lys Pro Gly Gly Cys Gln Glu
35 40 45

Phe Tyr Lys Ser Phe Asn Ile Met Lys Asn Ile Trp Ile Ile Pro Glu
50 55 60

Arg Asn Val Ile Gly Thr Thr Pro Gln Asp Phe His Pro Pro Thr Ser
65 70 75 80

Leu Lys Asn Gly Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu Gln Ser
85 90 95

Asp Glu Glu Lys Asp Arg Phe Leu Lys Ile Val Thr Lys Ile Phe Asn
100 105 110

Arg Ile Asn Asn Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu Leu Ser
115 120 125

Lys Ala Asn Pro Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn Gln Phe
130 135 140

His Ile Gly Asp Ala Ser Ala Val Glu Ile Lys Phe Ser Asn Gly Ser
145 150 155 160

Gln Asp Ile Leu Leu Pro Asn Val Ile Ile Met Gly Ala Glu Pro Asp
165 170 175

Leu Phe Glu Thr Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn Tyr Met
180 185 190

Pro Ser Asn His Gly Phe Gly Ser Ile Ala Ile Val Thr Phe Ser Pro
195 200 205

Glu Tyr Ser Phe Arg Phe Asn Asp Asn Ser Met Asn Glu Phe Ile Gln
210 215 220

Asp Pro Ala Leu Thr Leu Met His Glu Leu Ile His Ser Leu His Gly
225 230 235 240

Leu Tyr Gly Ala Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr Gln Lys
245 250 255

Gln Asn Pro Leu Ile Thr Asn Ile Arg Gly Thr Asn Ile Glu Glu Phe
260 265 270

Leu Thr Phe Gly Gly Thr Asp Leu Asn Ile Ile Thr Ser Ala Gln Ser
275 280 285

Asn Asp Ile Tyr Thr Asn Leu Leu Ala Asp Tyr Lys Lys Ile Ala Ser
290 295 300

Lys Leu Ser Lys Val Gln Val Ser Asn Pro Leu Leu Asn Pro Tyr Lys
305 310 315 320

Asp Val Phe Glu Ala Lys Tyr Gly Leu Asp Lys Asp Ala Ser Gly Ile
325 330 335

Tyr Ser Val Asn Ile Asn Lys Phe Asn Asp Ile Phe Lys Lys Leu Tyr
340 345 350

Ser Phe Thr Glu Phe Asp Leu Ala Thr Lys Phe Gln Val Lys Cys Arg
355 360 365

Gln Thr Tyr Ile Gly Gln Tyr Lys Tyr Phe Lys Leu Ser Asn Leu Leu
370 375 380

Asn Asp Ser Ile Tyr Asn Ile Ser Glu Gly Phe Asn Leu Arg Asn Thr
385 390 395 400

Asn Leu Ala Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met
405 410 415

Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys
420 425 430

Leu Leu Cys Val Arg Gly Ile Ile Thr Ser Lys
435 440

<210> 119

<211> 461

<212> PRT

<213> Clostridium botulinum

<400> 119

Met Pro Val Thr Ile Asn Asn Phe Asn Met Pro Phe Val Asn Lys Gln
1 5 10 15

Phe Asn Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr Ile Lys
20 25 30

Ile Pro Asn Ala Gly Gln Met Ile Met Met Glu Pro Pro Phe Ala Arg
35 40 45

Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp
50 55 60

Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn
65 70 75 80

Lys Ser Ser Gly Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro
85 90 95

Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn Ile Phe Phe Gln Thr Leu
100 105 110

Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu
115 120 125

Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val
130 135 140

Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys
145 150 155 160

Leu Ile Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala
165 170 175

Asn Leu Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr
180 185 190

Ile Asp Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly
195 200 205

Gly Ile Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn
 210 215 220
 Asn Val Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr
 225 230 235 240
 Phe Ser Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu
 245 250 255
 His Gly Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn
 260 265 270
 Glu Lys Lys Phe Phe Met Gln Ser Thr Asp Thr Ile Gln Ala Glu Glu
 275 280 285
 Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Ser Pro Ser Thr
 290 295 300
 Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val
 305 310 315 320
 Asp Arg Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn
 325 330 335
 Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu
 340 345 350
 Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe Asn Lys Leu
 355 360 365
 Tyr Lys Ser Leu Met Leu Gly Phe Thr Glu Ile Asn Ile Ala Glu Asn
 370 375 380
 Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro
 385 390 395 400
 Val Lys Ile Lys Asn Leu Leu Asp Asn Glu Ile Gly Phe Asn Leu Arg
 405 410 415
 Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn
 420 425 430
 Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe
 435 440 445
 Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser Lys
 450 455 460

<210> 120
 <211> 456
 <212> PRT
 <213> Clostridium botulinum

<400> 120

Met Pro Val Ala Ile Asn Ser Phe Asn Met Pro Phe Val Asn Lys Gln
 1 5 10 15

Phe Asn Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr Ile Lys
 20 25 30

Ile Pro Asn Ala Gly Gln Met Leu Tyr Met Gln Ile Pro Tyr Glu Glu
 35 40 45

Lys Ser Lys Lys Tyr Tyr Lys Ala Phe Glu Ile Met Arg Asn Val Trp
 50 55 60

Ile Ile Pro Glu Arg Asn Thr Ile Gly Thr Asn Pro Ser Asp Phe Asp
 65 70 75 80

Pro Pro Ala Ser Leu Lys Asn Gly Ser Ser Ala Tyr Tyr Asp Pro Asn
 85 90 95

Tyr Leu Thr Thr Asp Ala Glu Lys Asp Arg Tyr Leu Lys Thr Thr Ile
 100 105 110

Lys Leu Phe Lys Arg Ile Asn Ser Asn Pro Ala Gly Lys Val Leu Leu
 115 120 125

Gln Glu Ile Ser Tyr Ala Lys Pro Tyr Leu Gly Asn Asp His Thr Pro
 130 135 140

Ile Asp Glu Phe Ser Pro Val Thr Arg Thr Thr Ser Val Asn Ile Lys
 145 150 155 160

Leu Ser Thr Asn Val Glu Ser Ser Met Leu Leu Asn Leu Leu Val Leu
 165 170 175

Gly Ala Gly Pro Asp Ile Phe Glu Ser Cys Cys Tyr Pro Val Arg Lys
 180 185 190

Leu Ile Asp Pro Asp Val Val Tyr Asp Pro Ser Asn Tyr Gly Phe Gly
 195 200 205

Ser Ile Asn Ile Val Thr Phe Ser Pro Glu Tyr Glu Tyr Thr Phe Asn
 210 215 220

Asp Ile Ser Gly Gly His Asn Ser Ser Thr Glu Ser Phe Ile Ala Asp
 Page 48

225 230 235 240
 Pro Ala Ile Ser Leu₂₄₅ Ala His Glu Leu Ile₂₅₀ His Ala Leu His Gly₂₅₅ Leu
 Tyr Gly Ala Arg₂₆₀ Gly Val Thr Tyr Glu₂₆₅ Glu Thr Ile Glu Val₂₇₀ Lys Gln
 Ala Pro Leu₂₇₅ Met Ile Ala Glu Lys₂₈₀ Pro Ile Arg Leu Glu₂₈₅ Glu Phe Leu
 Thr Phe₂₉₀ Gly Gly Gln Asp Leu₂₉₅ Asn Ile Ile Thr Ser₃₀₀ Ala Met Lys Glu
 Lys₃₀₅ Ile Tyr Asn Asn Leu₃₁₀ Leu Ala Asn Tyr Glu₃₁₅ Lys Ile Ala Thr Arg₃₂₀
 Leu Ser Glu Val Asn₃₂₅ Ser Ala Pro Pro Glu₃₃₀ Tyr Asp Ile Asn Glu₃₃₅ Tyr
 Lys Asp Tyr Phe₃₄₀ Gln Trp Lys Tyr Gly₃₄₅ Leu Asp Lys Asn Ala₃₅₀ Asp Gly
 Ser Tyr Thr₃₅₅ Val Asn Glu Asn Lys₃₆₀ Phe Asn Glu Ile Tyr₃₆₅ Lys Lys Leu
 Tyr Ser₃₇₀ Phe Thr Glu Ser Asp₃₇₅ Leu Ala Asn Lys Phe₃₈₀ Lys Val Lys Cys
 Arg₃₈₅ Asn Thr Tyr Phe Ile₃₉₀ Lys Tyr Glu Phe Leu₃₉₅ Lys Val Pro Asn Leu₄₀₀
 Leu Asp Asp Asp Ile₄₀₅ Tyr Gly Phe Asn Leu₄₁₀ Arg Asn Thr Asn Leu₄₁₅ Ala
 Ala Asn Phe Asn₄₂₀ Gly Gln Asn Thr Glu₄₂₅ Ile Asn Asn Met Asn₄₃₀ Phe Thr
 Lys Leu Lys₄₃₅ Asn Phe Thr Gly Leu₄₄₀ Phe Glu Phe Tyr Lys₄₄₅ Leu Leu Cys
 Val Arg₄₅₀ Gly Ile Ile Thr Ser₄₅₅ Lys

<210> 121
 <211> 449
 <212> PRT
 <213> Clostridium botulinum

<400> 121

Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Thr Ile Asn
1 5 10 15

Asn Phe Asn Tyr Asp Arg Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys
20 25 30

Gln Glu Phe Tyr Lys Ser Phe Asn Ile Met Lys Asn Ile Trp Ile Ile
35 40 45

Pro Glu Arg Asn Val Ile Gly Thr Thr Pro Gln Asp Phe His Pro Pro
50 55 60

Thr Ser Leu Lys Asn Gly Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu
65 70 75 80

Gln Ser Asp Glu Glu Lys Asp Arg Phe Leu Lys Ile Val Thr Lys Ile
85 90 95

Phe Asn Arg Ile Asn Asn Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu
100 105 110

Leu Ser Lys Ala Asn Pro Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn
115 120 125

Gln Phe His Ile Gly Asp Ala Ser Ala Val Glu Ile Lys Phe Ser Asn
130 135 140

Gly Ser Gln Asp Ile Leu Leu Pro Asn Val Ile Ile Met Gly Ala Glu
145 150 155 160

Pro Asp Leu Phe Glu Thr Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn
165 170 175

Tyr Met Pro Ser Asn His Gly Phe Gly Ser Ile Ala Ile Val Thr Phe
180 185 190

Ser Pro Glu Tyr Ser Phe Arg Phe Asn Asp Asn Ser Met Asn Glu Phe
195 200 205

Ile Gln Asp Pro Ala Leu Thr Leu Met His Glu Leu Ile His Ser Leu
210 215 220

His Gly Leu Tyr Gly Ala Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr
225 230 235 240

Gln Lys Gln Asn Pro Leu Ile Thr Asn Ile Arg Gly Thr Asn Ile Glu
245 250 255

Glu Phe Leu Thr Phe Gly Gly Thr Asp Leu Asn Ile Ile Thr Ser Ala
260 265 270

Gln Ser Asn Asp Ile Tyr Thr Asn Leu Leu Ala Asp Tyr Lys Lys Ile
275 280 285

Ala Ser Lys Leu Ser Lys Val Gln Val Ser Asn Pro Leu Leu Asn Pro
290 295 300

Tyr Lys Asp Val Phe Glu Ala Lys Tyr Gly Leu Asp Lys Asp Ala Ser
305 310 315 320

Gly Ile Tyr Ser Val Asn Ile Asn Lys Phe Asn Asp Ile Phe Lys Lys
325 330 335

Leu Tyr Ser Phe Thr Glu Phe Asp Leu Ala Thr Lys Phe Gln Val Lys
340 345 350

Cys Arg Gln Thr Tyr Ile Gly Gln Tyr Lys Tyr Phe Lys Leu Ser Asn
355 360 365

Leu Leu Asn Asp Ser Ile Tyr Asn Ile Ser Glu Gly Tyr Asn Ile Asn
370 375 380

Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala Asn Leu Asn Pro Arg
385 390 395 400

Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val Lys Lys Ile Ile Arg
405 410 415

Phe Cys Lys Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly
420 425 430

Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser
435 440 445

Lys

<210> 122
<211> 459
<212> PRT
<213> Clostridium botulinum

<400> 122

Met Pro Val Ala Ile Asn Ser Phe Asn Tyr Asn Asp Val Thr Ile Asn
1 5 10 15

Asn Phe Asn Tyr Thr Ile Leu Tyr Met Gln Ile Pro Tyr Glu Glu Lys
 20 25 30
 Ser Lys Lys Tyr Tyr Lys Ala Phe Glu Ile Met Arg Asn Val Trp Ile
 35 40 45
 Ile Pro Glu Arg Asn Thr Ile Gly Thr Asn Pro Ser Asp Phe Asp Pro
 50 55 60
 Pro Ala Ser Leu Lys Asn Gly Ser Ser Ala Tyr Tyr Asp Pro Asn Tyr
 65 70 75 80
 Leu Thr Thr Asp Ala Glu Lys Asp Arg Tyr Leu Lys Thr Thr Ile Lys
 85 90 95
 Leu Phe Lys Arg Ile Asn Ser Asn Pro Ala Gly Lys Val Leu Leu Gln
 100 105 110
 Glu Ile Ser Tyr Ala Lys Pro Tyr Leu Gly Asn Asp His Thr Pro Ile
 115 120 125
 Asp Glu Phe Ser Pro Val Thr Arg Thr Thr Ser Val Asn Ile Lys Leu
 130 135 140
 Ser Thr Asn Val Glu Ser Ser Met Leu Leu Asn Leu Leu Val Leu Gly
 145 150 155 160
 Ala Gly Pro Asp Ile Phe Glu Ser Cys Cys Tyr Pro Val Arg Lys Leu
 165 170 175
 Ile Asp Pro Asp Val Val Tyr Asp Pro Ser Asn Tyr Gly Phe Gly Ser
 180 185 190
 Ile Asn Ile Val Thr Phe Ser Pro Glu Tyr Glu Tyr Thr Phe Asn Asp
 195 200 205
 Ile Ser Gly Gly His Asn Ser Ser Thr Glu Ser Phe Ile Ala Asp Pro
 210 215 220
 Ala Ile Ser Leu Ala His Glu Leu Ile His Ala Leu His Gly Leu Tyr
 225 230 235 240
 Gly Ala Arg Gly Val Thr Tyr Glu Glu Thr Ile Glu Val Lys Gln Ala
 245 250 255
 Pro Leu Met Ile Ala Glu Lys Pro Ile Arg Leu Glu Glu Phe Leu Thr
 260 265 270

Phe Gly Gly Gln Asp Leu Asn Ile Ile Thr Ser Ala Met Lys Glu Lys
275 280 285

Ile Tyr Asn Asn Leu Leu Ala Asn Tyr Glu Lys Ile Ala Thr Arg Leu
290 295 300

Ser Glu Val Asn Ser Ala Pro Pro Glu Tyr Asp Ile Asn Glu Tyr Lys
305 310 315 320

Asp Tyr Phe Gln Trp Lys Tyr Gly Leu Asp Lys Asn Ala Asp Gly Ser
325 330 335

Tyr Thr Val Asn Glu Asn Lys Phe Asn Glu Ile Tyr Lys Lys Leu Tyr
340 345 350

Ser Phe Thr Glu Ser Asp Leu Ala Asn Lys Phe Lys Val Lys Cys Arg
355 360 365

Asn Thr Tyr Phe Ile Lys Tyr Glu Phe Leu Lys Val Pro Asn Leu Leu
370 375 380

Asp Asp Asp Ile Tyr Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu
385 390 395 400

Ala Val Asn Asn Arg Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile
405 410 415

Asp Ser Ile Pro Asp Lys Gly Leu Val Glu Lys Asn Asn Met Asn Phe
420 425 430

Thr Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu
435 440 445

Cys Val Arg Gly Ile Ile Thr Ser Lys Arg Lys
450 455

<210> 123
<211> 12
<212> PRT
<213> Clostridium botulinum

<400> 123

Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp
1 5 10

<210> 124
<211> 11
<212> PRT
<213> Clostridium botulinum

<400> 124

Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp
1 5 10

<210> 125

<211> 4

<212> PRT

<213> Clostridium botulinum

<400> 125

Met Tyr Lys Asp
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<210> 126

<211> 7

<212> PRT

<213> Clostridium botulinum

<220>

<221> misc_feature

<222> (1)..(1)

<223> Xaa is any amino acid.

<220>

<221> misc_feature

<222> (3)..(5)

<223> Xaa is any amino acid.

<400> 126

Xaa Asp Xaa Xaa Xaa Leu Leu
1 5

<210> 127

<211> 7

<212> PRT

<213> Clostridium botulinum

<220>

<221> misc_feature

<222> (1)..(1)

<223> Xaa is any amino acid.

<220>

<221> misc_feature
<222> (3)..(5)
<223> Xaa is any amino acid.
<400> 127

Xaa Glu Xaa Xaa Xaa Leu Leu
1 5

<210> 128
<211> 7
<212> PRT
<213> Clostridium botulinum

<220>
<221> misc_feature
<222> (1)..(1)
<223> Xaa is any amino acid.

<220>
<221> misc_feature
<222> (3)..(5)
<223> Xaa is any amino acid.
<400> 128

Xaa Asp Xaa Xaa Xaa Leu Ile
1 5

<210> 129
<211> 7
<212> PRT
<213> Clostridium botulinum

<220>
<221> misc_feature
<222> (1)..(1)
<223> Xaa is any amino acid.

<220>
<221> misc_feature
<222> (3)..(5)
<223> Xaa is any amino acid.

<400> 129

Xaa Asp Xaa Xaa Xaa Leu Met
1 5

<210> 130

<211> 7

<212> PRT

<213> Clostridium botulinum

<220>

<221> misc_feature

<222> (1)..(1)

<223> Xaa is any amino acid.

<220>

<221> misc_feature

<222> (3)..(5)

<223> Xaa is any amino acid.

<400> 130

Xaa Glu Xaa Xaa Xaa Leu Ile
1 5

<210> 131

<211> 7

<212> PRT

<213> Clostridium botulinum

<220>

<221> misc_feature

<222> (1)..(1)

<223> Xaa is any amino acid.

<220>

<221> misc_feature

<222> (3)..(5)

<223> Xaa is any amino acid.

<400> 131

Xaa Glu Xaa Xaa Xaa Ile Leu
1 5

<210> 132
<211> 7
<212> PRT
<213> Clostridium botulinum

<220>

<221> misc_feature

<222> (1)..(1)

<223> Xaa is any amino acid.

<220>

<221> misc_feature

<222> (3)..(5)

<223> Xaa is any amino acid.

<400> 132

Xaa Glu Xaa Xaa Xaa Leu Met
1 5

<210> 133
<211> 4
<212> PRT
<213> Clostridium botulinum

<220>

<221> misc_feature

<222> (2)..(3)

<223> Xaa is any amino acid.

<220>

<221> misc_feature

<222> (4)..(4)

<223> Xaa is a hydrophobic amino acid.

<400> 133

Tyr Xaa Xaa Xaa
1

<210> 134
<211> 6
<212> PRT
<213> Clostridium botulinum

<400> 134

Phe Asp Lys Leu Tyr Lys
1 5

<210> 135
<211> 8
<212> PRT
<213> Clostridium botulinum

<400> 135

Pro Phe Val Asn Lys Gln Phe Asn
1 5

<210> 136
<211> 22
<212> PRT
<213> Clostridium botulinum

<400> 136

Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg
1 5 10 15

Gly Ile Ile Thr Ser Lys
20